



**US Army Corps
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Engineer Research and
Development Center

Sustainable Project Rating Tool (SPiRiT) version 1.4.1

Documentation Guide

Richard Schneider and Donald F. Fournier

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Sustainable Project Rating Tool (SPiRiT) version 1.4.1: Documentation Guide

Richard Schneider

*Construction Engineering Research Laboratory
PO Box 9005
Champaign, IL 61826-9005*

Donald F. Fournier

*Building Research Council
University of Illinois, Urbana-Champaign*

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ABSTRACT: The Sustainable Project Rating Tool (SPiRiT) was developed by the U.S. Army Engineer Research and Development Center (ERDC) as a measurement system for rating new and major renovations to institutional buildings. SPiRiT evaluates environmental performance from a whole building perspective over a building's life cycle and provides a definitive standard to assess the sustainability or "green" attributes of the design-construct process for a given project. SPiRiT addresses critical areas of the design-construct process for seven categories or issues: site, water, energy usage, materials, indoor environmental quality, facility delivery, and current mission. The rating system consists of prerequisites and credits that when met provide points towards an overall score. The overall score is used to indicate one of four project certification levels—Bronze, Silver, Gold, and Platinum, indicating increasing levels of sustainability or "greenness." All Army Military Construction projects and major OMA projects must achieve a Bronze rating level. This work was undertaken to provide current documentation for SPiRiT version 1.4.1.

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Preface

This study was conducted for the Directorate of Military Program, Headquarters, U.S. Army Corps of Engineers under Project 622784T45, “Energy Technology Applied to Military Facilities,” Work Unit N. X211, Task 23, “Guide on Sustainable Building Delivery – Self Assessment Charrette and Rating Checklist.” The technical monitor was Mr. Harry Goradia, CEMP-SPD.

The work was performed by the Facilities Maintenance Branch (CF-F), of the Facilities Division (CF), Construction Engineering Research Laboratory (CERL). The CERL Principal Investigator was Richard L. Schneider. Part of this work was performed under IDC Contract No. DACA88-99-D-0002, by Donald F. Fournier, who is associated with the Building Research Council, at the University of Illinois, Urbana-Champaign. Mark Slaughter is Chief, CECER-CF-F, and L. Michael Golish is Operations Chief, CECER-CF. The Director of CERL is Dr. Alan W. Moore.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Commander and Executive Director of ERDC is COL James R. Rowan, and the Director of ERDC is Dr. James R. Houston.

1 Introduction

Background

The Sustainable Project Rating Tool (SPiRiT) was developed by the U.S. Army Engineer Research and Development Center (Schneider, Flanders et al. 2001) and is a measurement system for rating new and major renovations to institutional buildings. It evaluates environmental performance from a whole building perspective over a building's life cycle and provides a definitive standard to assess the sustainability or "green" attributes of the design-construct process for a given project. SPiRiT was developed under a licensing agreement with the U.S. Green Building Council to adapt the Leadership in Energy and Environmental Design (LEED™) green building rating system to the military built environment (USGBC 2000). SPiRiT addresses critical areas of the design-construct process for seven categories or issues: site, water, energy usage, materials, indoor environmental quality, facility delivery, and current mission. The rating system consists of prerequisites and credits that when met provide points towards an overall score. Each credit has a defined intent and one or more requirements that must be met to garner the points. The overall score is used to indicate one of four project certification levels—Bronze, Silver, Gold, and Platinum. The order indicates increasing levels of sustainability or greenness. All Army Military Construction projects and major OMA projects must achieve a Bronze rating level. Projects selected as showcase projects need to achieve a Gold or Platinum certification level. Installations may select higher minimum rating levels for OMA projects.

Objective

The objective of this work was to provide DPW and COE District Engineer staffs with documentation to score projects designed to meet current SPiRiT requirements.

Approach

The SPiRiT scoring process guide involves a review of the design process. This is meant to be a self-assessment process by the building project team and the user.

SPiRiT scoring should be considered and addressed during the initial design charrette, after the design is complete, and after construction is complete. The approach recommends three periods during the design/construct process where SPiRiT scoring needs to be considered and addressed. These are during the initial design charrette, after the design is complete, and after construction is complete. Each period will be addressed separately.

Mode of Technology Transfer

This report will be made accessible through the World Wide Web (WWW) at URL:
<http://www.cecer.army.mil>

2 SPiRiT version 1.4.1 Documentation

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NOTES

This Sustainable Project Rating Tool (SPiRiT) is derived from The U. S. Green Building Council LE(Leadership in Energy and Environmental Design) Green Building Rating System™.

The SPiRiT numbering scheme parallels, but does not match LEED 2.0. LEED does not number major sections, which it calls 'Credit Categories,' ex. 'Sustainable Sites,' rather it numbers criteria or 'credits' within each major section. SPiRiT credit numbers match those of LEED where there is a 1:1 comparison. Where additional credits have been added they fall at the end of major sections.

The Recommended SPiRiT Documentation Credits all follow the format: Intent, Requirement, and Recommended Documentation.

Intent: A statement of the primary goal for the credit;

Recommended Documentation: Recommended sections of the specifications, drawings, and/or design analysis where information required substantiating the credit should be located.

Projects are evaluated for each SPiRiT credit which are either 'Prerequisites' or result in a point score:

Prerequisites: These credits are a statement of minimum requirements and must be met. No further points will be awarded unless the minimum is achieved. These credits are recognizable by an 'R' in the number scheme, ex. 1.R1, and a 'Reqd.' in the score column.

Point Score: These credits are evaluated and result in a point score. Where the potential score is greater than 1, no partial points are granted.

SPiRiT Sustainable Project Certification Levels:

SPiRiT Bronze 25 to 34 Points

SPiRiT Silver 35 to 49 Points

SPiRiT Gold 50 to 74 Points

SPiRiT Platinum 75 to 100 Points

SPiRiT credits have been developed to address facility life cycle phases including programming, design, construction, and commissioning.

POC for U. S. Army Corps of Engineers:

Mr. Harry Goradia
U. S. Army Corps of Engineers
ATTN: CEMP-ET
441 G Street NW
Washington, DC 20314
Phone (202) 761-7170, FAX (202) 761-0633
Email harry.goradia@hq02.usace.army.mil

POC for U. S. Army Installations:

Mr. John Scharl
U. S. Army Assistant Chief of Staff for Installation
Management
Directorate of Facilities & Housing
ATTN: DAIM-FDF
7701 Telegraph Road, Bldg #2594 (Room 146B),
Alexandria, VA 22315-3800
Phone (703) 428-7614, FAX (703) 428-0197
Email scharja@hqda.army.mil

Sustainable Project Rating Tool (SPiRiT) Authors are:

Stephen N. Flanders (Lead), U. S. Army Engineering Research & Development Center (ERDC-CRREL)

Richard L. Schneider, U. S. Army Engineering Research & Development Center (ERDC-CERL)

Donald Fournier, U. S. Army Engineering Research & Development Center (ERDC-CERL)

Annette Stumpf, U. S. Army Engineering Research & Development Center (ERDC-CERL)

1.0 Sustainable Sites Recommended Documentation

1.R1 Erosion, Sedimentation, and Water Quality Control ⁽¹⁾

Intent: Control erosion and pollutants to reduce negative impacts on water and air quality.

Suggested Documentation

Specifications: Include the language and specifically the objectives from 1.R1 in the general conditions of the specifications under the following the CSI Master Format Section: 01570 Temporary Controls, and 02370 Erosion and Sedimentation Control.

Drawings: Highlight erosion and sedimentation controls on the appropriate site plan sheet such as the Site Grading Plan, Site Demolition Plan, or Site Development Plan.

Design Analysis: ☐ *Prepare an Erosion and Sedimentation Control Plan to be included in the Design Analysis. Reference this plan in the general conditions sections of the specifications listed above.*

1.C1 Site Selection ⁽¹⁾

Intent: Avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site. Select site based on functional adjacencies/relationships and land use compatibility.

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

Suggested DocumentationSpecifications: ☐ NADrawings: ☐ NA

Design Analysis: ☐ *Include a narrative describing the site selection process. Specifically mention endangered species, prime training lands or agricultural land, flood plain situation, and wetland situations for the site. When available, include FEMA maps, or USGS soil surveys maps.*

Design Analysis: ☐ *Include a narrative describing the functional adjacencies and the land use compatibility of the selected site. Specifically mention the sites integration with surrounding uses and connectivity to transit systems.*

1.C2 Installation/Base Redevelopment (1)

Intent: Channel development to installation/base cantonment areas with existing infrastructure, protecting greenfields and preserving habitat and natural resources.

Suggested DocumentationSpecifications: ☐ NADrawings: ☐ NA

Design Analysis: ☐ *Describe the density goals for the project and discuss any density requirements from the base Master Plan. Calculate the radius to include in the local density by multiplying 3 times the square root of the site square footage (See LEED Reference Guide for more details). Include a table showing all buildings that fall within this radius (in whole or in part) and give the building square footage, and site area. Sum all the square footages and divide the total building area by total site area. Discuss how the local density fits with the project density goals.*

☐ *Include a narrative describing of existing infrastructure at the site such as roads, utilities, etc., and how the proposed project will take advantage of these existing features.*

(1) Adapted material not reviewed or endorsed by U. S. Green Building Council.

1.0 Sustainable Sites Recommended Documentation (Continued)

1.C3 Brownfield Redevelopment ⁽¹⁾

Intent: Rehabilitate damaged sites where development is complicated by real or perceived environmental contamination, reducing pressure on undeveloped land.

Suggested Documentation

Specifications: ☐ *Include specific requirements for site remediation in the following CSI Master Format Section: 02200 Site Hazardous Materials Removal, and 02300 Site Decontamination.*

Drawings: ☐ *NA*

Design Analysis: ☐ *For contaminated sites, include a Site Remediation Plan in accordance with the EPA's Brownfield Redevelopment program requirements. For previously remediated sites, include documentation from the site remediation that was performed showing compliance with the EPA standard mentioned.*

1.C4 Alternative Transportation ⁽¹⁾

Intent: Reduce pollution and land development impacts from automobile use.

Suggested Documentation

Specifications: ☐ *Specify bike parking under one of the following CSI Master Format Sections: 05500 Metal Fabrications, and 11000 Equipment.*

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

- Drawings:
- ❑ *Highlight bike parking on the Landscaping Plan, Site Development Plan, or equivalent plan. Include details for bike storage installation in the Site Details sheets. Also highlight the location of showers on the architectural plans.*
 - ❑ *Show the number of parking spaces provided on the appropriate site plan drawing such as the Site Paving Plan, or Site Development Plan. Highlight preferred parking for carpools or vanpools.*
 - ❑ *Provide an area drawing or site map highlighting the refueling station location and showing the project location and indicate the distance between them. Include a scale bar for distance measurement.*
- Design Analysis:
- ❑ *Describe the proximity to installation mass transit system in a design narrative. Specify the distance to bus stops or commuter rail, light rail, or subway stops.*
 - ❑ *Provide calculations showing that bike storage and shower facilities are provided for at least 5% of the building occupants.*
 - ❑ *Provide calculations for the number of parking spaces in the design analysis.*
 - ❑ *Include a narrative describing local zoning parking requirements and provide calculations demonstrating compliance with the minimum allowable requirements*

1.0 Sustainable Sites Recommended Documentation (Continued)

1.C5 Reduced Site Disturbance ⁽¹⁾

Intent: Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

Suggested Documentation

Specifications: ❑ *01560 Temporary barriers and enclosures, 02230 Site Clearing, and 02300 Earthwork.*

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

Drawings: ☐ *Show the boundary for site disturbance on the Site Grading Plan, Site Demolition/Development Plans, or equivalent plans demonstrating that all site disturbance is within the required dimensions.*

OR For the restoration option discussed in this credit, show the planting areas as well as a planting schedule on the Landscape Plan. Distinguish between existing landscaping and restored landscaping.

Design Analysis: ☐ *Include a copy of the open space requirements from the Installation Master Plan or local zoning code. Provide calculations demonstrating that the requirement has been satisfied.*

1.C6 Stormwater Management ⁽¹⁾

Intent: Limit disruption of natural water flows by minimizing storm water runoff, increasing on-site infiltration, and reducing contaminants.

Suggested Documentation

Specifications: ☐ *02600 Drainage and Containment, and 02700 Pavements.*

☐ *02300 Earthwork, and 11300 Fluid Waste Treatment and Disposal Equipment.*

Drawings: ☐ *On the appropriate site plan, such as the Site Paving Plan or Landscape Plan, highlight paved area and site contours showing how water is retained on site. Provide a paving schedule indicating the type of paving used in each area and a reference to the perviousness of the material. Also highlight locations of retaining ponds or other systems intended to minimize stormwater runoff.*

☐ *Show the location of passive systems on the appropriate site plan such as on the Site Grading Plan, Site Development Plan, or Landscape Plan. Include detail drawings for active systems such as mechanical filters*

Design Analysis: ☐ *Provide cut sheets for pervious paving systems used to lower runoff.*

OR Provide a stormwater management plan as described in the credit for sites with existing imperviousness.

☐ *Provide calculations showing that run off has been reduced by 50% from undeveloped to developed conditions. Provide a design narrative and calculations describing how the designed treatment systems will meet the requirements of this credit.*

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

1.0 Sustainable Sites Recommended Documentation (Continued)

1.C7 Landscape and Exterior Design to Reduce Heat Islands (2)

Intent: Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Suggested Documentation

Specifications: ☐ 02700 Pavements, 02900 Planting

☐ 07300 Steep Roofing, 07400 Roofing and Siding Panels, 07500 Membrane Roofing

Drawings: ☐ *On the Landscaping plans, show location, type of vegetation used for shading, and information about the mature size of selected vegetation. Highlight the impervious area to be shaded, or otherwise demonstrate with calculations and diagrams that 30% will be shaded with in 5 years.*

OR Indicate on the Site Paving Plan the area where light-colored/high-albedo materials will be used and demonstrate that it accounts for at least 30% of the impervious areas.

OR Demonstrate that at least 50% of the total parking is under-ground by indicating the number of spaces located in the underground parking as well as the number of parking spaces above ground. When underground parking is provided, the first few sheets of the architectural plans are typically reserved for below-grade floors and parking information used to satisfy this credit should be shown on these sheets.

OR Indicate on the Site Paving Plan the area where pervious paving systems will be used and demonstrate that it accounts for at least 50% of the parking lot areas. Also include a note on the Paving Plan drawings stating that the pervious paving system is to have an impervious area of LESS than 50%.

☐ *On the Roof Plan, show that a minimum of 75% of the roof area meets the requirements for reflectance and emissivity. Specify roofing type, reflectance, and emissivity on the Roof Plan as well as any area calculations.*

☐ *For Green roofs, show on the Roof Plan that the green roof covers at least 50% of the total roof area. Also reference detail drawings for the green roof. (Detail drawings are typically included toward the end of the Architectural pages of the Construction Documents.)*

Design Analysis: ☐

1.C8 Light Pollution Reduction (1)

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Intent: Eliminate light trespass from the building site, improve night sky access, and reduce development impact on nocturnal environments.

Suggested Documentation

Specifications: ☐ 16500 Lighting

Drawings: ☐ On electrical plans, highlight exterior lighting as needed to demonstrate compliance.

Design Analysis: ☐ Include cutsheets and lighting calculations in the Design Analysis that demonstrate compliance.

1.C9 Optimize Site Features

Intent: Optimize utilization of the site's existing natural features and placement of man-made features on the site.

Suggested Documentation

Specifications: ☐ 02230 Site Clearing, 02300 Earthwork, and 13600 Solar and Wind Energy Equipment.

Drawings: ☐ NA

Design Analysis: ☐ Include a narrative describing the prevailing winds and solar properties of the site that were taken into consideration in the design. Also describe systems incorporated into the building to take advantage of free site energy to meet the requirements.

AND

☐ In the Design Analysis describe efforts taken to minimize cut and fill on the site in accordance with this credit. On the Site Grading Plan show existing and proposed contours.

1.0 Sustainable Sites Recommended Documentation (Continued)

1.C10 Facility Impact

Intent: Minimize negative impacts on the site and on neighboring properties and structures; avoid or mitigate excessive noise, shading on green spaces, additional traffic, obscuring significant views, etc.

(1) Adapted material not reviewed or endorsed by U. S. Green Building Council.

**Suggested
Documentation**

Specifications: ☐ NA

Drawings: ☐ NA

Design Analysis: ☐ *Include a narrative describing the measures taken to minimize impact on the site through employing the appropriate densities and taking advantage of adjacencies. Explain how the proposed design meets intent of the Base Master Plan.*

☐ *Include diagrams for solar access and the resulting shadows for winter and summer seasons. Indicate the prevailing winds on a site plan diagram.*

☐ *Include a narrative of measures taken to reduce excess noise, minimize blocking of significant views, and transportation planning measures. Refer to specific drawings when appropriate.*

1.C11 Site Ecology

Intent: Identify and mitigate all existing site problems including contamination of soil, water, and air, as well as any negative impacts caused by noise, eyesores, or lack of vegetation, enhancing or creating new site habitat.

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

Design Analysis: ☐ *Include a Site Ecology Plan for environmental management and mitigation of negative impacts.*

2.0 Water Efficiency Recommended Documentation

2.C1 Water Efficient Landscaping (2)

Intent: Limit or eliminate the use of potable water for landscape irrigation.

Suggested Documentation

Specifications: ☐ *02810 Irrigation systems, 02900 Plantings, 02600 Drainage and Containment*

☐ *02810 Irrigation systems, 02900 Plantings, 02600 Drainage and Containment*

Drawings: ☐ *Show and highlight the location of rainwater collection cistern on the Site plan.*

☐ *Note on Landscape plans "NO PERMANENT LANDSCAPE IRRIGATION SYSTEM TO BE INSTALLED"*

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- Design Analysis: ☐ *Include a narrative describing the irrigation system and the features that make it efficient. Provide baseline calculations and design calculations for the insulation system. Also include an explanation of native or adapted planting.*
- OR** Provide a narrative describing the gray water irrigation system. Provide baseline calculations and design calculations for the insulation system. Also include an explanation of native or adapted planting.
- ☐ *Include a narrative describing the gray water irrigation system. Provide baseline calculations and design calculations showing that the system is capable of providing 100% of the irrigation required for the site.*
- OR** Provide a narrative describing how the site will not require permanent irrigation.

2.C2 Innovative Wastewater Technologies (2)

Intent: Reduce generation of wastewater and potable water demand, while increasing local aquifer recharge.

Suggested Documentation

- Specifications: ☐ *15400 Plumbing Fixtures and Equipment, 11300 Wastewater Biological Sys. Equip., 13220 Wastewater Filtration Equip., 13260 Wastewater Handling and Treatment Equip.*
- Drawings: ☐ *Highlight fixtures and schedules on the Plumbing Plans for systems used to reduce potable water use.*
- OR** Show organic or natural treatment systems on the Site Plan or on the Landscape Plan. Show location of mechanical treatments systems on the Floor Plan and submit shop drawings. Highlight high-efficiency plumbing fixtures on the Mechanical or Plumbing sheets.
- Design Analysis: ☐ *Describe measures taken to reduce potable water consumption. Provide design calculations and baseline calculations for municipally provided potable water.*
- OR** Provide design calculations for the on-site wastewater system. Describe how the system works and demonstrate that it is capable of treating all wastewater to the required levels.

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2.C3 Water Use Reduction ⁽¹⁾

Intent: Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

**Suggested
Documentation**

Specifications: ☐ *15400 Plumbing Fixtures and Equipment, 15700 HVAC Equipment, and Division 11—Equipment.*

Drawings: ☐ *NA*

Design Analysis: ☐ *Describe the strategies used to reduce the water consumption by 20% from the baseline calculations. Provide design calculations and baseline calculations demonstrating compliance.*

☐ *Provide design calculations and baseline calculations demonstrating a total 30% reduction of water use from the baseline calculations.*

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

3.0 Energy and Atmosphere Recommended Documentation**3.R1 Fundamental Building Systems Commissioning ⁽¹⁾**

Intent: Verify and ensure that fundamental building elements and systems are designed, installed, and calibrated to operate as intended.

Suggested Documentation

Specifications: ☐ 01800 Facility Operation, and 15950 Testing/Adjusting/Balancing.

Drawings: ☐ NA

Design Analysis: ☐ Provide a copy of the contract with the commissioning agent and a copy of the commissioning plan. Include a narrative that describes how the other aspects of this requirement have been satisfied.

3.R2 Minimum Energy Performance ⁽¹⁾

Intent: Establish the minimum level of energy efficiency for the base building and systems.

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

Design Analysis: ☐ *Provide a narrative or summary table of design features that comply with TI-800-01 which references UFC 3-400-01, Design: Energy Conservation.*

☐ *Provide a copy of the report from energy simulation software (BLAST, DOE-2, and EnergyPlus) as per requirements of ASHRAE 90.1-2001 demonstrating compliance as outlined.*

3.R3 CFC Reduction in HVAC&R Equipment (2)

Intent: Reduce ozone depletion.

Suggested Documentation

Specifications: ☐ *15600 Refrigeration Equipment, 15700 HVAC Equipment, and 01800 Facility Operation.*

Drawings: ☐ *NA*

Design Analysis: ☐ *Provide or include a review of the CFC phase-out/conversion in the commissioning plan demonstrating compliance as outlined.*

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3.0 Energy and Atmosphere Recommended Documentation (Continued)

3.C1 Optimize Energy Performance ⁽¹⁾

Intent: Achieve increasing levels of energy performance above the prerequisite standard to reduce environmental impacts associated with excessive energy use.

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

Design Analysis: ☐ *Provide a narrative describe the energy saving measures incorporated in the building. Show a table of model variables that differ from the baseline case to the proposed design and give the values used in the energy simulation.*

☐ *Provide a copy of the report from energy simulation software (BLAST, DOE-2, and EnergyPlus) showing the percentage that the Energy Cost Budget (the performance baseline) is less than the Design Energy Cost as defined in draft Appendix G to ASHRAE 90.1-2001. Life Cycle Costing is to be done in accordance with 10 CFR 436.*

3.C2 Renewable Energy ⁽¹⁾

Intent: Encourage and recognize increasing levels of self-supply through renewable technologies to reduce environmental impacts associated with fossil fuel energy use.

Suggested Documentation

Specifications: ☐ *01800 Facility Operation, 13600 Solar and Wind Energy Equipment, and 16200 Electrical Power.*

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

Drawings: ☐ *Highlight the location of renewable energy systems on the Site Plan and on the architectural plans where appropriate.*

Design Analysis: ☐ *Provide calculations showing the percentage of building energy provided by on-site renewable energy systems. Include a narrative describing energy saving measures incorporated in the building. Include a section in the Commissioning Plan to insure that the percentage of power provided by renewable systems is maintained throughout the facility life cycle.*

3.C3 Additional Commissioning (2)

Intent: Verify and ensure that the entire building is designed, constructed, and calibrated to operate as intended.

Suggested Documentation

Specifications: ☐ *01800 Facility Operation, and 15950 Testing/Adjusting/Balancing.*

Drawings: ☐ *NA*

Design Analysis: ☐ *Include a copy of the contract for additional commissioning and the commissioning plan in the Design Analysis.*

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3.0 Energy and Atmosphere Recommended Documentation (Continued)

3.C4 << Deleted >> (1)

3.C5 Measurement and Verification (1)

Intent: Provide for the ongoing accountability and optimization of building energy and water consumption performance over time.

Suggested Documentation

Specifications: ☐ 16290 Power Measure & Control, and 15900 HVAC Instrumentation and Control.

Drawings: ☐ Highlight the equipments installed in the building for purposes of monitoring on the Mechanical Plan, and Electrical Plan.

Design Analysis: ☐ Include a list of all measurement devices installed in the building. Also provide a copy of the measurement and verification plan with a summary schedule of instruments and controls related to each monitoring category.

3.C6 Green Power (1)

Intent: Encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.

Suggested Documentation

Specifications: ☐ NA

(1) Adapted material not reviewed or endorsed by U. S. Green Building Council.

Drawings: ☐ NA

Design Analysis: ☐ *Provide calculations for the expected building power consumption, based on the building energy modeling results. Include a copy of a minimum 2-year contract to purchase power equal to the projected building consumption.*

3.C7 Distributed Generation

Intent: Encourage the development and use of distributed generation technologies, which are less polluting than grid-source energy.

Suggested Documentation

Specifications: ☐ *01800 Facility Operation, 13600 Solar and Wind Energy Equipment, and 16200 Electrical Power.*

Drawings: ☐ *Highlight the location of generation equipment/facilities on the Site Plan.*

Design Analysis: ☐ *Provide narrative including calculations demonstrating that the on-site energy generation system is capable of supplying 50% of the building energy requirements. Include a section in the Commissioning Plan to insure that the percentage of power provided by renewable systems is maintained throughout the facility life cycle.*

4.0 Materials and Resources Recommended Documentation**4.R1 Storage & Collection of Recyclables ⁽¹⁾**

Intent: Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

Suggested Documentation

Specifications: ☐ 11170 *Solid Waste Handling Equipment.*

Drawings: ☐ *Highlight the area for collection of recyclables on the floor plans. Also highlight locations of waste collection chutes and receptacle areas.*

Design Analysis: ☐ *Provide a narrative substantiating that the space allotted for collection of recyclables is adequate for the facility.*

4.C1 Building Reuse ⁽¹⁾

Intent: Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste, and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

Suggested Documentation

Specifications: ☐ 02225 *Selective Demolition.*

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

- Drawings: ☐ *Note and highlight on the architectural demolition drawings the structural elements which are to be preserved. On the Elevations, note and highlight the shell elements to be preserved.*
- ☐ *Provide calculations substantiating that 100% of the existing building structure and shell are being preserved **AND** 50% of the non-shell components.*
- Design Analysis: ☐ *Provide calculations substantiating that at least 75% of the existing building structure and shell are being preserved.*

4.C2 Construction Waste Management ⁽¹⁾

Intent: Divert construction, demolition, and land clearing debris from landfill disposal. Redirect recyclable material back to the manufacturing process.

Suggested Documentation

- Specifications: ☐ *01505 Construction Waste Management.*
- Drawings: ☐ *Indicate on appropriate architectural, plumbing, mechanical, and electrical demolition drawings which materials are expected to be diverted.*
- Design Analysis: ☐ *Include a Construction Waste Management Plan.*

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

4.0 Materials and Resources Recommended Documentation (Continued)

4.C3 Resource Reuse (2)

Intent: Extend the life cycle of targeted building materials, reducing environmental impacts related to materials manufacturing and transport.

Suggested Documentation

Specifications: ☐ XX050 for each material division.

Drawings: ☐ Indicate with notes on appropriate architectural drawing where refurbished materials are to be used.

Design Analysis: ☐ Provide a table listing all sections of the specifications where salvaged or refurbished material have been specified including the respective estimated dollar values of these materials. Demonstrate that this accounts for 5% or 10% of the building materials used.

4.C4 Recycled Content (1)

Intent: Increase demand for building products that have incorporated recycled content material, reducing the impacts resulting from extraction of new material.

Suggested Documentation

Specifications: ☐ XX050 for each material division.

Drawings: ☐ NA

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(1) Adapted material not reviewed or endorsed by U. S. Green Building Council.

Design Analysis: ☐ *Provide a table listing all sections of the specifications where recycled materials or materials with recycled content are available. List the percentage of recycled content per material, the estimated quantity, the cost, and the total estimated project cost. Provide calculations showing that the requirement(s) has been satisfied.*

4.C5 Local/Regional Materials (2)

Intent: Increase demand for building products that are manufactured locally, reducing the environmental impacts resulting from transportation, and supporting the local economy.

Suggested Documentation

Specifications: ☐ *XX050 for each material division.*

Drawings: ☐ *NA*

Design Analysis: ☐ *Provide a table listing all sections of the specifications for which material is available within a 500 mile radius. List the estimated quantity, unit cost, and the total estimated project cost. Demonstrate that 20% of the building materials were obtained within a 500 mile radius.*

☐ *List the estimated quantity, unit cost, and the total estimated project cost. Demonstrate that 50% of the building materials above were harvested, extracted, or recovered within a 500 mile radius*

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4.0 Materials and Resources Recommended Documentation (Continued)

4.C6 Rapidly Renewable Materials (2)

Intent: Reduce the use and depletion of finite raw and long cycle renewable materials by replacing them with rapidly renewable materials.

Suggested Documentation

Specifications: ☐ *XX050 for each division, and 09600 Flooring.*

Drawings: ☐ *Note on appropriate architectural finish drawings where rapidly renewable materials are required.*

Design Analysis: ☐ *Provide a table listing sections of the specifications that call for rapidly renewable materials. Show calculations that demonstrate that rapidly renewable materials account for 5% of total building materials.*

4.C7 Certified Wood (2)

Intent: Encourage environmentally responsible forest management.

Suggested Documentation

Specifications: ☐ *06100 Rough Carpentry, 06200 Finish Carpentry, and 06400 Architectural Woodwork.*

Drawings: ☐ *Note on applicable architectural and structural drawings where certified wood is to be used.*

Design Analysis: ☐ *Provide a list of all wood-based products used. Highlight the areas where certified wood-based materials were used and demonstrate that certified wood accounts for 50% of all wood used for the project. Supply copies of wood certification documentation from the manufacturer.*

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5.0 IEQ Recommended Documentation

5.R1 Minimum IAQ Performance (1)

Intent: Establish minimum IAQ performance to prevent the development of indoor air quality problems in buildings, maintaining the health and well being of the occupants.

Requirement: ☐ *Meet the minimum requirements of voluntary consensus standard ASHRAE 62-1999, Ventilation for Acceptable Indoor Air Quality and approved Addenda.*

Suggested Documentation

Specifications: ☐ *01800 Facility Operation, and 15950 Testing/Adjusting/Balancing.*

Drawings: ☐ *Include a note on the first sheet of the mechanical drawings indicating desired compliance with ASHRAE 62-1999.*

Design Analysis: ☐ *Include a section in the design analysis describing the ventilation systems and how the project complies with ASHRAE 62-1999. Also state design criteria and assumptions.*

5.R2 Environmental Tobacco Smoke (ETS) Control (2)

Intent: Prevent exposure of building occupants and systems to Environmental Tobacco Smoke (ETS).

Suggested Documentation

Specifications: ☐ *01800 Facility Operation, and 15950 Testing/Adjusting/Balancing.*

Drawings: ☐ *Indicate designated outdoor smoking areas on the Site Plan (if applicable).*

(1) Adapted material not reviewed or endorsed by U. S. Green Building Council.

Design Analysis: ☐ NA

5.C1 **IAQ Monitoring** ⁽¹⁾

Intent: Provide capacity for indoor air quality (IAQ) monitoring to sustain long-term occupant health and comfort.

Suggested Documentation

Specifications: ☐ *01800 Facility Operation, 13850 Detection and Alarm, and 15950 Testing/Adjusting/Balancing. Specifically note that indoor CO₂ levels should never be permitted to exceed outdoor levels by more than 530 parts per million.*

Drawings: ☐ *Highlight the location of CO₂ monitoring equipment in the Mechanical Drawings. Also state the set-point parameters.*

Design Analysis: ☐ NA

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

5.0 IEQ Recommended Documentation (Continued)**5.C2 Increase Ventilation Effectiveness (2)**

Intent: Provide for the effective delivery and mixing of fresh air to building occupants to support their health, safety, and comfort.

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

Design Analysis: ☐ *Provide plan and elevation drawings including furniture for each major room type. Graphically show how the airflow patterns are designed to meet the requirements of this credit. Also include a specification table of all the terminal vents, grills, and registers cross-referenced in the drawings.*

5.C3 Construction IAQ Management Plan (2)

Intent: Prevent indoor air quality problems resulting from the construction/renovation process, to sustain long term installer and occupant health and comfort.

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

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- Design Analysis:
- ☐ *Provide a copy of the Construction IAQ Management Plan to be implemented during construction and pre-occupancy. Highlight areas that demonstrate how the SMACNA guidelines have been met or exceeded.*
 - ☐ *Provide a letter from the architect or engineer detailing the building flush-out process, or provide a letter specifying an indoor air quality test to be performed in accordance with this credit following construction.*

5.C4 Low-Emitting Materials (2)

Intent: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.

Suggested Documentation

Specifications: ☐ *05950 Paints & Protective Coatings, 06100 Rough Carpentry, 06600 Plastic Fabrications, 07900 Joint Sealers, 09600 Flooring, 09700 Wall Finishes, and 09900 Paints & Coatings.*

Drawings: ☐ *NA*

Design Analysis: ☐ *NA*

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5.0 IEQ Recommended Documentation (Continued)

5.C5 Indoor Chemical and Pollutant Source Control ⁽¹⁾

Intent: Avoid exposure of building occupants to potentially hazardous chemicals that adversely impact air quality.

**Suggested
Documentation**

Specifications: ☐ 08400 Entrances, 12400 Furnishings and Accessories, and 15100 Building Services Piping.

Drawings: ☐ *Note permanent entryway systems such as grills, grates, etc. at all exterior entrances on the First Floor Plan or other plan sheets with building entrances from outdoors. Cross-reference and highlight positive pressure systems for entryways with the Mechanical Plans. Also highlight the exhaust air systems used in chemical use areas (housekeeping and copy/print rooms). Highlight drainage systems for rooms where chemical and water mixing may occur in the Plumbing Plans and Plumbing Schematics.*

Design Analysis: ☐ NA

5.C6 Controllability of Systems ⁽²⁾

Intent: Provide a high level of individual occupant control of thermal, ventilation, and lighting systems to support optimum health, productivity, and comfort conditions.

**Suggested
Documentation**

Specifications: ☐ 08500 Windows, and 15900 HVAC Instrumentation and Controls.

⁽¹⁾ Adapted material not reviewed or endorsed by U. S. Green Building Council.

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- Drawings: ☐ *Provide a window schedule highlighting the operable windows for rooms with floor area within 15 feet of the perimeter. Highlight the location lighting controls on the Electrical Plan.*
- ☐ *Indicate lighting controls on the Electrical Plan. Highlight temperature and airflow controls on the Mechanical Plan, or Air Distribution Plan. Indicate the expected occupancy of each non-perimeter room on the Floor Plan.*
- Design Analysis: ☐ *Provide a floor plan diagram showing a line indicating 15 feet from building perimeter. Demonstrate with calculations that each room within 15 feet of the perimeter has at least one operable window and one lighting control zone for every 200 square feet of floor area that is regularly occupied.*
- ☐ *Provide a floor plan diagram showing a line indicating 15 feet from building perimeter. Demonstrate with a table or other calculations that lighting and airflow controls have been provided for each occupant for all regularly occupied rooms not within 15 feet of the building perimeter.*

5.C7 Thermal Comfort (2)

Intent: Provide for a thermally comfortable environment that supports the productive and healthy performance of the building occupants.

Suggested Documentation

- Specifications: ☐ *13400 Measurement and Control Instrumentation, 13500 Recording Instrumentation, and 13800 Building Automation and Control*
- Drawings: ☐ *Highlight the location of temperature and humidity monitoring systems on the Mechanical Plan or Air Distribution Plan.*
- Design Analysis: ☐ *Provide a letter from the mechanical engineer stating that the system design is done in accordance with ASHRAE standard 55-1992 Addenda 1995. For naturally ventilated systems, provide a letter from the mechanical engineer stating that the project complies with the 90% acceptability limits of the adaptive comfort temperature boundaries in the California High Performance Schools (CHPS) Best Practices Manual Appendix C – A Field Based Thermal Comfort Standard for Naturally Ventilated Buildings, Figure 2.*
- ☐ *Provide a narrative from the mechanical engineer describing the location of, and monitoring instrumentation installed. Reference appropriate plan sheets where the equipment discussed is shown.*

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5.0 IEQ Recommended Documentation (Continued)

5.C8 Daylight and Views (2)

Intent: Provide a connection between indoor spaces and the outdoor environment through the introduction of sunlight and views into the occupied areas of the building.

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

Design Analysis: ☐ *Provide calculations based on the Daylight Factor equation from the LEED2.0 Reference Guide showing that 75% of all spaces occupied for critical visual tasks have at least a 2% daylight factor.*

☐ *Provide calculations with a supporting floor plan diagrams indicating the lines of sight and access to views for 90% of occupied spaces.*

5.C9 Acoustic Environment /Noise Control

Intent: Provide appropriate acoustic conditions for user privacy and comfort.

Suggested Documentation

Specifications: ☐ *13080 Sound, and Vibration and Seismic Control.*

Drawings: ☐ NA

Design Analysis: ☐ *Provide a narrative detailing the existing environmental noise issues and describe the measures employed to mitigate the environmental noise issues.*

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5.C10 **Facility In-Use IAQ Management Plan**

Intent: Insure the effective management of facility air quality during its life.

**Suggested
Documentation**

Specifications: ☐ *15900 HVAC Instrumentation and Controls.*

Drawings: ☐ *NA*

Design Analysis: ☐ *Provide a draft version of the Air Quality Action Plan outlining occupant/manager training and also a systems maintenance schedule.*

6.0 **Facility Delivery Process Recommended Documentation****6.C1** **Holistic Delivery of Facility**

Intent: Encourage a facility delivery process that actively engages all stakeholders in the design process to deliver a facility that meets all functional requirements while effectively optimizing tradeoffs among sustainability, first costs, life cycle costs, and mission requirements.

**Suggested
Documentation**

Specifications: ☐ *NA*

Drawings: ☐ *NA*

- Design Analysis: ☐ *Include a section entitled Facility Delivery Report that documents the design process showing how the credit requirements were met. As a minimum, include the following information showing attainment for each requirement.*
- ☐ *Provide a list of perspective team members with brief descriptions of their previous experience. Include team members who may have been consultants during the design process.*
- ☐ *Provide a schedule of training dates to take place during the construction process. Show that the entire team was trained and that all members of the delivery team were aware of the project goals and objectives.*
- ☐ *Provide a list and explanation of the sustainability goals used during the project design.*
- ☐ *Submit a list of charrettes conducted and a description of each including dates, agenda, and results. A minimum set of charrettes includes planning charrette, ecological design charrette, and scoring charrettes.*
- ☐ *Provide a list of suggested portions of the project that may benefit from a more in-depth analysis of first cost, life-cycle cost as compared to mission requirements and project goals. Submit a tentative schedule of team meetings to discuss each of the suggested portions of the project.*
- ☐ *Submit a list of measurable facility operations that can be used to document the performance of the building through its entire life-cycle.*

7.0 Current Mission Recommended Documentation

7.C1 Operation and Maintenance

Intent: Encourage the development of a facility delivery process that enhances efficient operation and maintenance of the facility.

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

Design Analysis: ☐ *Develop a Facility Operations and Maintenance Manual including sections on facility commissioning requirements, O&M instruction including preventative maintenance, training programs for occupants and personnel, green housekeeping, and recycling/waste management. Specifically address each of the points as outlined.*

7.C2 Soldier and Workforce Productivity and Retention

Intent: ☐ *Provide a high-quality, functional, healthy, and safe work environment to promote soldier and workforce productivity and retention.*

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

Design Analysis: ☐ *Prepare a narrative of design considerations and steps taken in the design process to enhance the quality and functionality of the indoor environment, and contribute to the health, safety, and productivity of the building occupants. Specifically address each of the points as outlined. These design considerations will later be incorporated into the Soldier and Workforce Productivity Report that will document how these goals have been met.*

8.0 Future Missions Recommended Documentation

8.C1 Functional Life of Facility and Supporting Systems

Intent: Assess the functional life of a facility and its supporting systems to optimize the infrastructure investment.

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

Design Analysis: ☐ *Submit a letter from the architect or responsible design professional describing the durability and projected life-span of the building structure and envelope, HVAC and plumbing systems, communications and electronic systems, electrical and power systems, and any other germane systems. Include descriptions of any measures taken during the design process to maximize the useful-life of the building.*

8.C2 Adaptation, Renewal and Future Uses

Intent: Encourage facility design that is responsive to change over time to maximize accommodation of future uses without creating waste and insuring maximum useful life of products.

Suggested Documentation

Specifications: ☐ NA

Drawings: ☐ NA

Design Analysis: ☐ *Submit a letter from the architect or responsible design professional describing possible design features that add flexibility to the building in terms of possible future adaptive uses for the facility. Include a description of design features that accommodate efficient adaptation and reconfiguration of these systems. Describe the technologies and strategies employed in the design including but not limited to those described in this credit. Also include a letter from the architect stating that the design uses the minimal amount of space necessary to adequately meet the current mission and functional requirements while incorporating expansion and adaptation capabilities for future missions.*

Completed Documentation Checklist**1.0 Sustainable Sites (S)**

- | | | |
|-------|------------------------------------------------------|--------------------------|
| 1.R1 | Erosion, Sedimentation and Water Quality Control | <input type="checkbox"/> |
| 1.C1 | Site Selection | <input type="checkbox"/> |
| 1.C2 | Installation/Base Redevelopment | <input type="checkbox"/> |
| 1.C3 | Brownfield Redevelopment | <input type="checkbox"/> |
| 1.C4 | Alternative Transportation | <input type="checkbox"/> |
| 1.C5 | Reduced Site Disturbance | <input type="checkbox"/> |
| 1.C6 | Stormwater Management | <input type="checkbox"/> |
| 1.C7 | Landscape and Exterior Design to Reduce Heat Islands | <input type="checkbox"/> |
| 1.C8 | Light Pollution Reduction | <input type="checkbox"/> |
| 1.C9 | Optimize Site Features | <input type="checkbox"/> |
| 1.C10 | Facility Impact | <input type="checkbox"/> |
| 1.C11 | Site Ecology | <input type="checkbox"/> |

2.0 Water Efficiency (W)

- 2.C1 Water Efficient Landscaping
- 2.C2 Innovative Wastewater Technologies
- 2.C3 Water Use Reduction

3.0 Energy and Atmosphere (E)

- 3.R1 Fundamental Building Systems Commissioning
- 3.R2 Minimum Energy Performance
- 3.R3 CFC Reduction in HVAC&R Equipment
- 3.C1 Optimize Energy Performance
- 3.C2 Renewable Energy
- 3.C3 Additional Commissioning
- 3.C4 <<Deleted>>
- 3.C5 Measurement and Verification
- 3.C6 Green Power
- 3.C7 Distributed Generation

4.0 Materials and Resources (M)

- 4.R1 Storage & Collection of Recyclables
- 4.C1 Building Reuse
- 4.C2 Construction Waste Management
- 4.C3 Resource Reuse
- 4.C4 Recycled Content
- 4.C5 Local/Regional Materials
- 4.C6 Rapidly Renewable Materials
- 4.C7 Certified Wood

5.0	Indoor Environmental Quality (IEQ) [Q]	
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5.R1	Minimum IAQ Performance	
5.R2	Environmental Tobacco Smoke (ETS) Control	
5.C1	IAQ Monitoring	
5.C2	Increase Ventilation Effectiveness	
5.C3	Construction IAQ Management Plan	
5.C4	Low-Emitting Materials	
5.C5	Indoor Chemical and Pollutant Source Control	
5.C6	Controllability of Systems	
5.C7	Thermal Comfort	
5.C8	Daylight and Views	
5.C9	Acoustic Environment /Noise Control	
5.C10	Facility In-Use IAQ Management Plan	

Completed Documentation Checklist (Continued)

6.0	Facility Delivery Process (P)	
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6.C1	Holistic Delivery of Facility	
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7.0	Current Mission	
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7.C1	Operation and Maintenance	
7.C2	Soldier and Workforce Productivity and Retention	

8.0	Future Missions	
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8.C1	Functional Life of Facility and Supporting Systems	
8.C2	Adaptation, Renewal and Future Uses	

Project Points of Contact

3 Conclusion

This work has provided documentation to score projects designed to meet requirements of SPiRiT version 1.4.1. The SPiRiT scoring process guide involves a review of the design process. This is meant to be a self-assessment process by the building project team and the user. SPiRiT scoring should be considered and addressed during the initial design charrette, after the design is complete, and after construction is complete.

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14. ABSTRACT The Sustainable Project Rating Tool (SPiRiT) was developed by the U.S. Army Engineer Research and Development Center (ERDC) as a measurement system for rating new and major renovations to institutional buildings. SPiRiT evaluates environmental performance from a whole building perspective over a building's life cycle and provides a definitive standard to assess the sustainability or "green" attributes of the design-construct process for a given project. SPiRiT addresses critical areas of the design-construct process for seven categories or issues: site, water, energy usage, materials, indoor environmental quality, facility delivery, and current mission. The rating system consists of prerequisites and credits that when met provide points towards an overall score. The overall score is use to indicate one of four project certification levels—Bronze, Silver, Gold, and Platinum, indicating increasing levels of sustainability or "greenness." All Army Military Construction projects and major OMA projects must achieve a Bronze rating level. This work was undertaken to provide current documentation for SPiRiT version 1.4.1.					
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